

Minus One Risk/Hazard Category Rule for Switching

Summary

For operation of equipment, such as operation of switches and circuit breakers, performed outside of closed enclosures the Risk/Hazard Category as posted on the equipment may be reduced in accordance with the following table.

POSTED R/H CATEGORY	R/H CATEGORY COVERS CLOSED
0*	Insignificant Arc-Flash Hazard (No Category) Eye protection still required
1	0*
2	1
3	2
4	4 (Category not reduced)

Relevant Codes Sections

NFPA 70E Article 130, Table 130.7(C)(9)(a) Risk/Hazard Categories

Discussion / Analysis

NFPA 70E and IEEE 1584 provide methods for calculating potential incident energy exposures for working on or near exposed energized parts. However, potential also exists outside of closed enclosures for injury from exposure to harmful hot gasses escaping from enclosures with covers closed when an arc-fault occurs inside the electrical equipment.

While there is no accepted quantitative method for calculating the incident energy of the escaping hot gasses qualitative analysis has determined that the exposing energy will be less than the incident energy if the worker were exposed directly to the exposed live part. Factors considered in this determination are:

- The worker will not be exposed to direct radiant energy
- The worker arc-blast will be mitigated by the energy being absorbed by the metal enclosure deformation
- The potential molten material should be mostly deposited on surfaces inside the enclosure
- The temperature of the escaping gases will be lowered as the enclosure will absorb some of the heat.
- Shrapnel should be contained within the enclosure or even if the enclosure blows open due to the blast the speed should be lowered due to the delay in the enclosure opening.

NFPA 70E Table 130.7(C)9(a) reflects this quantitative philosophy. As an example working on or near energized parts in a 240Volt panelboard is Risk/Hazard Category 1, while operation of circuit breakers is Risk/Hazard Category 0, a reduction of 1 level. However, the absolute values of this table can only be used within the bounding conditions specified in the notes. No guidance is provided when the bounding

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conditions are exceeded. This interpretation simply extends the reduction of hazard philosophy as it applies to conditions for which the specific hazard has been calculated and documented. This interpretation presented in this document is consistent, but somewhat more restrictive than the formal NFPA 70E code change proposal, see Appendix A, being submitted endorsed by EFCOG.

The committee felt that due to the high energies of a Category 4 arc-flash event, and the fairly wide range of the category, that the PPE requirements should not be reduced for an arc-flash calculated at a category 4 level. This exception differs from the NFPA 70E proposal and is more conservative.

APPENDIX A – NFPA 70E Proposal

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NFPA 70E

70E-372 Log #206 EEW-AAA
(130.7(C)(10) Exception (New))

Final Action:

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Recommendation: Add an exception to read as follows:

Exception: The hazard/risk category shall be permitted to be reduced by one number when the task is done with all covers in place, all fasteners appropriately installed and the arc incident exposure is obtained using the detailed flash hazard analysis approach described in 130.3. Leather gloves shall be worn regardless of hazard/risk category.

Substantiation: The standard does not provide guidance for tasks that are done within a flash protection boundary but outside the equipment with all covers in place, (e.g., operating a switch or circuit breaker with covers on) when the exposure is calculated formally. Taken literally, the standard does not provide protective credit for operating equipment in its designed operating state when the bounding assumptions in the notes to Table 130. 7(C)(9)(a) are not met. Table 130.7(C)(9)(a) provides precedence that reducing the hazard/risk category is technically justified by reducing the task by one number when covers are on. This proposal would make the PPE for the task consistent with the Table. Leather gloves need to be worn to protect the hands in category HC 1 and below.